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A Performance Measure for Continuity of Care After Detoxification: Relationship With Outcomes

Margaret T. Lee, PhD^{1,*}, Constance M. Horgan, ScD¹, Deborah W. Garnick, ScD¹, Andrea Acevedo, PhD¹, Lee Panas, MS¹, Grant A. Ritter, PhD¹, Robert Dunigan, PhD¹, Hermik Babakhanlou-Chase, MPH², Alfred Bidorini, MA³, Kevin Campbell, DrPH⁴, Karin Haberlin, MA³, Alice Huber, PhD⁴, Dawn Lambert-Wacey, MA⁵, Tracy Leeper, MA⁶, and Mark Reynolds, EdD⁶

¹Institute for Behavioral Health, The Heller School for Social Policy and Management, Brandeis University, Waltham, MA 02454-9110

²Bureau of Substance Abuse Services, Massachusetts Department of Public Health, Boston, MA 02108

³Connecticut Department of Mental Health and Addiction Services, Hartford, CT 06134

⁴Washington State Department of Social and Health Services, The Division of Behavioral Health and Recovery, Olympia, WA 98501

⁵New York State Office of Alcoholism and Substance Abuse Services, Division of Outcome Management and System Investment, Albany, N.Y. 12203

⁶Oklahoma Department of Mental Health and Substance Abuse Services, Oklahoma City, OK 73152

Abstract

Administrative data from five states were used to examine whether continuity of specialty substance abuse treatment after detoxification predicts outcomes. We examined the influence of a 14-day continuity of care process measure on readmissions. Across multiple states, there was support that clients who received treatment for substance use disorders within 14-days after discharge from detoxification were less likely to be readmitted to detoxification. This was particularly true for reducing readmissions to another detoxification that was not followed with treatment and when continuity of care was in residential treatment. Continuity of care in outpatient treatment was related to a reduction in readmissions in some states, but not as often as when continuity of care occurred in residential treatment. A performance measure for continuity of care after detoxification is a useful tool to help providers monitor quality of care delivered and to alert them when improvement is needed.

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*Corresponding author: 415 South St., Waltham, MA 02454-9110 Phone: 781-736-3966, Fax: 781-736-3985, mlee@brandeis.edu.

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Keywords

continuity of care; detoxification; performance measures; readmission; administrative data

1. Introduction

Detoxification is a set of interventions focused on managing acute intoxication and withdrawal from a substance. By itself, detoxification does little to address long standing psychological, social and behavioral problems associated with substance use, but rather serves as a way to prepare and connect individuals to rehabilitative treatment (Carrier et al., 2011; Center for Substance Abuse Treatment, 2006; National Institute on Drug Abuse, 1999; Specka, Buchholz, Kuhlmann, Rist, & Scherbaum, 2011). Rates of continuing into treatment after detoxification remain low (Campbell et al., 2010; Carrier et al., 2011; Carroll, Triplett, & Mondimore, 2009), although the benefit of timely treatment after detoxification is widely acknowledged (Carrier et al., 2011; Ford & Zarate, 2010; McLellan, Weinstein, Shen, Kendig, & Levine, 2005; Stein, Kogan, & Sorbero, 2009).

A performance measure for continuity of care after detoxification can be a useful tool to help providers monitor their performance and alert them when rates are low and changes are needed to bring about improvements. However, widespread support for this specific performance measure would be strengthened by evidence linking continuity into treatment with better client outcomes since improved outcomes is the ultimate goal of treatment for addiction. It is also important to understand whether the specific level of care that the client enters after detoxification makes a measurable difference in outcomes. These considerations are the focus of this study.

1.1 Continuity into treatment services after detoxification is associated with a range of outcomes

There are multiple benefits to be gained from continuity of care after detoxification. One recent study showed that linking a client to treatment within a short window of time after leaving detoxification was associated with longer periods of abstinence, fewer numbers of arrests, and fewer days in jail in the year after discharge from detoxification (Ford & Zarate, 2010). In addition, continuity of care after detoxification was found to be predictive of reduced likelihood of homelessness and increased likelihood of being employed by the three month follow-up (Ford & Zarate, 2010).

In contrast, individuals who experience detoxification that is not followed by rehabilitative treatment are likely to relapse to substance use, which may result in readmission to another detoxification (McLellan et al., 2005). A longer period of time between detoxification admissions is generally viewed as a better outcome, since this indicates that the individual is experiencing a longer period before a relapse occurs. Several studies have reported that time to readmission was longer when the client continued to treatment after detoxification (Mark, Vandivort-Warren, & Montejano, 2006; Thakur, Hoff, Druss, & Catalanotto, 1998).

Detoxification presents an opportunity for a client to continue on to substance abuse treatment after they have been stabilized, but approximately only a quarter to a half of clients continue on to treatment after detoxification (Campbell et al., 2010; Carrier et al., 2011; Mark, Dilonardo, Chalk, & Coffey, 2003; Mark et al., 2006; Stein et al., 2009). Among the benefits of successful continuity of care after detoxification is that it helps to reduce the “revolving door” phenomenon of repeated detoxifications without treatment, which is costly and not effective for achieving recovery (Kertesz, Horton, Friedmann, Saitz, & Samet, 2003; McCarty, Caspi, Panas, Krakow, & Mulligan, 2000).

It is noteworthy, however, that some in the treatment field acknowledge that a readmission to detoxification may not necessarily be a negative event for a client, particularly if it serves as a gateway to treatment. Some readmissions to detoxification include other interventions such as outpatient counseling, medical and psychiatric services, or referral to treatment (Amodeo, Lundgren, Chassler, & Witas, 2008; Specka et al., 2011). Although states may not commonly report it as an eligibility requirement, anecdotally, we hear from residential providers that detoxification is required before entering their programs (Brolin, Cruz, & Girard, 2012). If being readmitted to detoxification involves interventions that benefit the client or helps prepare the client for further treatment, such a readmission to detoxification may be viewed as a positive event. This is consistent with the concept of substance abuse as a chronic illness, in which clients may have multiple treatment episodes on the road to recovery.

1.2 Monitoring Continuity of Care Using a Performance Measure

Generally, researchers report that continuity of care within a short window of time after discharge from detoxification is associated with positive outcomes (Carrier et al., 2011; Ford & Zarate, 2010; Stein et al., 2009). Carrier and colleagues (2011) found that clients who had continuity of care within a short interval of time, specified as 3 days after discharge from inpatient detoxification, were less likely to be readmitted to detoxification within 6 months of discharge. This effect was no longer evident when continuity of care occurred within 30 days after discharge. Mark and colleagues (2006) show that clients receiving two or more substance abuse treatment services within 30 days of discharge from detoxification were less likely to be readmitted to another detoxification in the year after discharge from the first detoxification, and had longer time to readmission.

The Washington Circle, a group of researchers, government officials, and policy makers, specified a performance measure as connection to treatment with at least one treatment service within 14 days of discharge from detoxification (McCorry, Garnick, Bartlett, Cotter, & Chalk, 2000), and later worked with twelve states’ treatment agencies, using their administrative data to examine patterns of detoxification and confirm the recommendation of this measure for specialty care in the public sector (Garnick et al., 2011; Garnick, Lee, Horgan, Acevedo, & Washington Circle Public Sector Workgroup, 2009).

With the growing emphasis on quality of care in substance abuse treatment, use of performance measures to monitor continuity of care is an approach that may bring about an increase in continuity of care after discharge from detoxification. Several state agencies have used a continuity of care after detoxification measure to monitor service delivery to clients.

The New York Office of Alcoholism and Substance Abuse Services uses a 14-day continuity of care after detoxification measure for monitoring program performance and field office staff discuss the measure with the programs during program review. Connecticut's Department of Mental Health and Addiction Services has used a 30-day continuity of care measure for profiling and feedback to providers regarding their performance (Daley et al., 2010; Daley et al., 2011), and Colorado has also used a 30-day measure to monitor the percent of clients who enter treatment after detoxification (Wendt, 2008).

1.3 Continuity level of care

Intensity of care varies with the different levels of care available within the treatment system, and the level of care that clients enter after detoxification may make a difference in their outcomes. One study found that detoxification clients who followed up with residential treatment had lower rates of relapse to drug use than those who followed up with outpatient treatment (McCusker, Bigelow, Luippold, Zorn, & Lewis, 1995). Yet another study found that meeting continuity of care with outpatient or residential care was equally effective in achieving better outcomes (Ford & Zarate, 2010).

1.4 Goals of this study

Because performance measures are standards to strive for and they are more widely accepted as tools for monitoring quality of care when they are shown to be related to outcomes, the goals of this paper are to use data from multiple states to examine the following:

1. Is continuity of care after detoxification related to better outcomes (reduction in any readmissions)? Does continuity of care help to reduce readmissions not followed by treatment?
2. Do outcomes differ by whether continuity of care after detoxification occurs in outpatient or residential treatment?

2. Methods

2.1 Data

This study focused on adult clients who received publicly-funded detoxification services in five states that had participated in the examination of the measures as part of the Washington Circle Public Sector Workgroup: Connecticut, Massachusetts, New York, Oklahoma, and Washington (Garnick et al., 2009). Each state substance abuse agency collects data from facilities that are licensed by the state; most also receive state funding to provide treatment services to indigent populations. We used admission data which generally included client demographics (e.g., age, gender, race/ethnicity), living situation, treatment referral source, and substance use based on client's self-report, and we also obtained the discharge date for each admission.

2.2 Sample selection

The study sample was made up of adult clients (ages 18+) who were discharged from inpatient detoxification during 2008 (Connecticut, New York, Oklahoma, Washington) or

2007 (Massachusetts). If clients had more than one detox admission during the target year, only the client's first admission of the year was used in the analyses. This prevents clients with multiple admissions from exerting undue effect on our estimates, and also avoids the need to deal with correlated outcomes from multiple admissions of the same client. The majority of clients in our sample did not have another readmission during the target year. However there was variation among states with approximately a quarter of clients in Oklahoma and Washington having other detoxifications during the year, approximately a third of clients in New York and Connecticut, and about two-fifths (39%) in Massachusetts. We excluded client records for four reasons: (1) detoxification length of stay that was longer than 14 days, as they were likely to be data entry errors (the exception was for New York's medically monitored withdrawal services where we excluded records of detoxification stays >21 days since these services allowed longer than 14 day stays), (2) records that did not have client data (e.g., employment status) collected within 30 days of admission, (3) records for clients who did not complete detoxification because of reasons outside of their control (e.g., went into a hospital for medical reasons or were incarcerated), or had death listed as reason for discharge, and (4) clients with missing data on independent variables. Using these rules, 56 clients were excluded from Connecticut, 1,495 from Massachusetts, 5,402 from New York, 447 from Oklahoma, and 1,172 from Washington.

We examine the impact of continuity of care specified as continuing onto treatment within 14 days after discharge from detoxification. After all exclusions, the final analytic sample for examining the influence of 14-day continuity consisted of 5,566 in Connecticut, 18,329 in Massachusetts, 40,980 in New York, 2,310 in Oklahoma, and 7,330 in Washington. The sample size for the survival analysis was slightly less due to missing covariates.

2.3. Levels of care analyzed

2.3.1. Detoxification Services—In Connecticut, Massachusetts, Oklahoma and Washington, there is a single definition of detox which shares the common elements of being a service delivered by medical and nursing professionals that provides for 24-hour medically directed evaluation and withdrawal management in an acute care inpatient setting. New York, however, offers three types of inpatient detoxification:

- Medically managed detoxification (MMD) – withdrawal and stabilization services for clients who are acutely ill from alcohol or substance-related addictions that include the need for medical management. This includes 48-hour observation bed service. Clients who have stabilized in this service may step-down to medically supervised service.
- Medically supervised withdrawal (MSW) – withdrawal and stabilization for clients who are suffering from mild to moderate withdrawal. Clients who have stabilized in medically supervised withdrawal may step down to medically supervised outpatient services or to medically monitored withdrawal.
- Medically monitored withdrawal (MMW) – withdrawal and stabilization for clients suffering from mild withdrawal or a situational crisis related to drugs or alcohol. Clients do not have to meet a medical threshold to receive this crisis service and

clients who have stabilized in either of the above may step down to this service. This is the only type of detoxification in New York that is not Medicaid eligible.

Because the three types of detoxification within the state were quite different, we analyzed them separately. Preliminary analyses of the distributions of the samples supported this approach, since clients in New York's MMW were found to have very different characteristics compared with clients admitted to other types of detoxification in the state. The MMW facilities had more men, more homeless, more alcohol users, and more criminal justice referrals.

2.3.2 Residential Services—Residential treatment provides care 24 hours a day in a structured, generally in non-hospital settings and focuses on all aspects of substance use rehabilitation.

2.3.3 Outpatient Services—Outpatient services are day treatment where the client does not stay overnight at the facility. This level of care typically includes individual or group counseling, and intensity of treatment may vary by facility. In our analyses, we combined outpatient and intensive outpatient treatment.

2.4 Variables

2.4.1 Identification of the Event for Survival Analysis—Our chosen analytic approach, survival analysis, requires the identification of an event, the time to which is then modeled with covariates, including our indicator for continuity of care. It is likely that the expected and commonly accepted event for a study such as ours would be (1) the client has any readmission to detoxification. To satisfy this expectation, as well as to examine sensitivity, we identify this as one potential event of interest for our analyses. However, in recent years it has become increasingly acknowledged that not all readmissions to detoxification are necessarily bad. In particular, a more careful consideration of substance abuse clients' treatment histories would view readmissions to detoxification, which are quickly followed by further treatment, as positive occurrences. Many detoxification clients have multiple admissions and each one may potentially be the one that connects the client to treatment that is successful. Accordingly, our study identifies (2) the client has readmission to a detoxification not quickly followed by further treatment, as an alternative and possibly preferable event of interest. Our survival analyses will model the number of days to each of these events (1 and 2 above), understanding that model (1) provides results based on the conventional view that all readmissions to detoxification are bad, while (2) provides results based on a newer, more nuanced view that only readmissions to detoxification not followed by further treatment are negative. Figure 1 illustrates the timeline of continuity of care and events for our survival analysis, and events 1 and 2 described above are noted.

2.4.2 Independent Variables—In our survival analyses, our main independent variable is whether the client has continuity of care within 14 days after discharge from the index detoxification (i.e., the first detoxification during the target year). In particular, we determine if time to event is impacted by whether the client has continuity of care or not. As a secondary question, we also run models on subsamples to see whether the effect of continuity differs for clients entering outpatient treatment versus clients entering residential

treatment after discharge. This is somewhat analogous to an education study in which the primary question is whether going to college after high school graduation is beneficial with respect to later annual salary, but also asking the secondary question of whether it makes a difference whether the college attended is public or private.

Detoxifications that were separated by three days or fewer were combined as one admission. For example, if a client was discharged from detoxification and was then re-admitted to another detoxification on day 1, 2 or 3 after initial discharge, the two detoxifications were combined and treated as one, using the admission date of the earlier one and the discharge date of the later one. Analysis showed that generally, no more than 7% of detoxifications were collapsed due to the 3 day rule with the exception of New York's MMW sample (23%).

2.4.3 Covariates—The Behavioral Model of Health Services Use (Andersen & Davidson, 2007) suggests that health services utilization and outcomes are influenced by both individual and contextual factors. Covariates used in our regression models consist of client variables (demographic characteristics, substance use, treatment referral source, and prior year detoxification) which previous research has found to be associated with treatment outcomes. Demographics included gender, age, race/ethnicity, education, employment status, homelessness, and marital status. Unless noted, the data used to determine client-level covariate values based on client self-report were collected by staff at the treatment facilities at treatment admission as part of their mandated reporting to the Substance Abuse and Mental Health Services Administration (SAMHSA) for Federal Block Grant funding.

2.4.3.1. Substance use, prior detoxification, and treatment referral: Two covariates concern the client's substance use: a variable indicating substance use in the past month (further differentiated as follows: alcohol but not opiates, opiates but not alcohol, both alcohol and opiates, neither alcohol nor opiates), and age of first use. As a measure of severity, we also included in our models the number of detoxification admissions that the client had in the year prior to the index detoxification (coded as 0, 1, 2+).

Additionally, our models included a covariate for referral source with values indicating self/family, community agency or group (e.g., child protective services), addiction service (e.g., another substance abuse treatment program), other health professional (e.g., mental health or medical provider), criminal justice system (e.g., department of corrections, drug court), and other (e.g., employer, school personnel, clergy).

2.4.3.2 Facility continuity of care rate: The facility-level continuity of care is an indicator of how well the facility is performing in terms of getting its clients to continuing care after they leave their facility. Continuity of care may be met with the client continuing onto any level of care after detoxification, but not by entering another detoxification or other crisis care. Facility continuity of care rates related to how the facility conducts business and whether they have protocols put in place to ensure continuity of care. Because facility-level continuity of care rates may also predict the likelihood of a client's readmission (Finney, Humphreys, Kivlahan, & Harris, 2011), facility continuity of care rates were calculated by dividing the number of clients at the facility who had continuity of care within 14 days of

discharge from detoxification by the total number of clients who had an index detoxification at the facility (prior to exclusions noted in section 2.2). To eliminate multicollinearity between the client-level and the facility-level variables, the client-level continuity of care variable was centered at the respective facility-level mean. The regression coefficient for this centered variable represents the impact of the client-level continuity variable after adjustment for the impact of the facility-level variable.

2.5 Analysis

2.5.1 Specification of the continuity of care measure—We investigated how the level of subsequent treatment should be handled, and whether it is appropriate to combine continuity into outpatient treatment and residential treatment together to create one measure, or keep them separate and create two measures.

In addition, we conducted a sensitivity test of a 14-day measure by comparing results with 7 and 30 day specifications, which allowed a shorter or longer window of time to meet the continuity of care measure. Little variation was found in resulting continuity of care rates indicating low sensitivity for the measure, so we used 14 days as the window of time to allow continuity of care to occur after discharge from the index detoxification.

2.5.2 Impact of continuity of care on readmission—Our analyses consist of multivariate Cox proportional hazards regressions to examine the effect of continuity of care status on the hazard of readmission, after adjusting for potential differences in facility and other confounding covariates at the client and facility levels. Survival analyses, such as the Cox model, express the effects of variables in the model as “hazard ratios” which reflect a change in the likelihood of an outcome.

We utilized hierarchical survival analysis to examine the relationship between continuity of care and days to detoxification readmission controlling for clustering of clients within facility, which might lead to correlation in their outcomes (Therneau & Grambsch, 2000). An important decision in survival analysis is the selection of the time of origin, or “time 0”, which is the time we start to check for outcomes, which in our study is readmission to detoxification. At first glance, the time of discharge would seem to represent a fair starting time, but actually this choice allows the risk of bias because of the time during which the exposure (i.e., continuity of care) could not occur (Suissa, 2007, 2008). A client, who is readmitted to detoxification within the time allowed to meet the continuity of care criteria, is by definition a client with a short time to readmission with a negative continuity of care status. Including such clients in the analysis would unfairly bias the results towards rejection of the null hypothesis. Instead, we drop such clients because they did not have the full opportunity to meet the continuity of care measure. These exclusions ranged from 0.7% in Oklahoma to 6.7% in Massachusetts. All analyses were then limited to clients who did not have a readmission within the 14-day window after discharge from the index. All clients remaining in the analytic file, regardless of whether they met continuity of care within 14-days of discharge, had a time 0 of 14 days after discharge, the time when the continuity of care measure could have been met. This method reduces bias that may arise when any group

of clients may have more or less time to potentially experience the outcome (Mi, Hammill, Curtis, Greiner, & Setoguchi, 2013).

When readmission had not occurred for a client within a year of time 0, the outcome value was censored at 365 days. An exception would be a client who was incarcerated or admitted to residential admission during the year after the time 0, thereby temporarily suspending the potential for readmission. In those cases, the days in residential or in jail/prison were considered a “time-out”, and the follow-up period was extended by the number of days in the controlled environment. Therefore, the maximum time-to-event remains 365 days. In cases where the new follow-up period, accounting for time in a controlled setting, did not allow for 365 days between time 0 and December 31 of the target year, the last day for which data are available, the clients’ time to readmission were censored at December 31. For clients whose length of stay went beyond December 31, the data were censored at the beginning of the incarceration or residential stay.

3. Results

3.1 Sample characteristics

Table 1 shows demographic characteristics of our sample by state, as well as substance use history, treatment referral source, prior detoxification, and facility-level continuity rate where the client received detoxification services. The three groups of inpatient detoxification clients in New York are shown separately.

Across all states, about a quarter to a third of the sample was female except for the medically monitored withdrawal (MMW) sample in New York that had fewer women (19%). In terms of race/ethnicity, a majority of clients were white, except in New York where 39% to 46% were white, depending on the type of detoxification. There were higher percentages of black (29% to 40%) and Latino clients (14% to 26%) in New York than in the other states. Only in Oklahoma and Washington were there a large enough percentage of American Indians (> 5%) to include them as a separate category. Homelessness ranged from 11% of clients in Oklahoma to 52% in New York’s MMW. In Washington, the percent of clients without a high school degree (71%) was much higher than in the other states (ranging from 25% to 35%). The percent of unemployed clients was fairly high across all states at 79% or higher. Opiate use (without alcohol) in Connecticut (43%) and Massachusetts (44%) was higher than in other states. The percent of clients who had at least one detoxification admission in the prior year ranged from about 5% in Connecticut and Oklahoma to 26% in Massachusetts. With the exception of Connecticut and Oklahoma, approximately 10% of clients had one detoxification in the year prior and approximately another 10% had two or more in the prior year.

In New York, a higher percent of MMW clients (67%) reported alcohol use (without opiates) than clients in other types of detoxification in New York (52% MMD and 54% MSW) and more than clients in other states (ranging from 38% in Massachusetts to 58% in Washington). MMW clients in New York also had a higher percent (13%) of clients who were referred from the criminal justice system compared to the other forms of detoxification

in the state (1% MMD, 5% MSW) or other states (ranging from 1% in Massachusetts to 9% in Oklahoma).

Table 1 also shows continuity of care rates per facility, indicating how well each facility performed in connecting their clients to care after detoxification. Using a 14-day continuity of care definition, facility continuity of care rates ranged from 14% in Connecticut facilities to 43% for New York's MSW facilities.

3.2 Continuity of care rates

Table 2 shows the percent of clients meeting continuity of care within 14 days of discharge from their index detoxification, the detoxification which makes them eligible for the study. The table shows overall continuity rates in the top row, and below provides rates for the levels of care, outpatient (including intensive outpatient) or residential, which clients received to satisfy the continuity of care requirement.

Overall continuity of care rates, met with any level of care, ranged from 13% in Connecticut to 46% in New York's MSW. With the exceptions of New York's MSW (46%) and MMW (33%), overall continuity of care rates were 25% or less. Continuity of care rates for outpatient and residential treatment split fairly evenly in Connecticut, Massachusetts, and Oklahoma. However, in New York and Washington, higher percentages of clients had continuity of care in residential treatment.

We also conducted an analysis to determine whether a small number of facilities had particularly high or low continuity rates and whether some set of outliers might exert undue influence on the continuity rate in any of the states (data not shown). These analyses did not find any evidence of undue outlier influence.

3.3 Bivariate analysis

Table 3 shows readmission rates in the year following discharge by category of client. The first row of the table shows overall readmission rates among all clients meeting the continuity of care criteria across all levels of care, and subsequent rows shows corresponding rates for the level of care by which continuity of care was met. The overall readmission rate in the top row will be a weighted average of these component rates. The final two rows of the table show readmission rates among clients who did not meet the continuity of care criteria. To match the two types of events for our planned survival analyses, rates are shown based on two types of readmissions: (1) any readmission (regardless of whether the readmission was followed by treatment or not), and (2) a readmission not followed within a short time by treatment.

In general, clients with no continuity of care appear to be more likely to have a readmission detoxification not followed by treatment. For example, Table 3 shows that 23.5% of Connecticut detoxification clients, who did not have continuity of care, had a readmission that was not followed by treatment compared to 14% of clients with continuity of care. However, Table 3 provides only preliminary, bivariate associations, which do not control for the influence of other relevant independent variables. The main results of our study will be

based on multivariate survival analyses, which estimate the influence of continuity of care on our outcomes, when other factors are controlled for.

3.4 Survival analysis results

Survival analyses support that having continuity of care in any level of care within 14 days of leaving detoxification is related to a lower hazard of any readmission in three of the five states. In four states (CT, MA, NY- MSW, and WA), however, continuity of care within 14 days of discharge from detoxification lowers the hazard of readmissions that are not followed by treatment.

Results for readmission by level of care in which continuity of care occurred show that when continuity of care was in residential treatment, clients in Connecticut, Massachusetts, New York's MSW, and Washington had a lower hazard of either type of readmission. Continuity of care did not have a significant influence on readmission among clients in Oklahoma. In New York, the effect of continuity of care varied by type of detoxification. MSW clients who met continuity of care in residential treatment had a lower hazard of both types of readmissions. MMD clients in New York who had continuity of care in residential treatment, had a lower hazard of having a readmission not followed by treatment (HR = 0.81, CI = 0.74, 0.88), but the same effect was not found for any readmission. MMW clients with continuity of care in residential treatment had a higher hazard of any readmission (HR = 1.17, CI = 1.04, 1.33).

Findings for when continuity of care was in outpatient treatment show that in Massachusetts, there was a reduction in the hazard of a readmission regardless of the continuity level of care or the type of readmission. In other states, continuity of care in outpatient treatment was also significant, in some cases, of reducing the hazard of readmissions; however, results in other states were more inconsistent compared to when continuity of care was in residential treatment. When continuity of care was in outpatient treatment, we found a reduced hazard of readmission not followed by treatment in Connecticut (HR= 0.60, CI = 0.46, 0.80), Massachusetts (HR = 0.78, CI = 0.69, 0.87), and New York's MSW (HR = 0.77, CI = 0.60, 1.00). Clients in Connecticut and Washington who had continuity of care in outpatient treatment had an increased hazard to any readmission.

We included facility-level continuity of care rate as a covariate in our models and results were varied (data not shown) and facility-level continuity of care rate did not consistently predict client readmissions.

4. Discussion

4.1 Impact of continuity of care on readmission

Past studies examining readmission to detoxification generally focus on any readmission regardless of whether they are followed by treatment or not. However, some would argue that while the goal may be to reduce all types of readmissions, treatment programs should especially strive to reduce readmission to another detoxification that is not accompanied or followed with any treatment services. We examined both types of readmissions and found that in 4 out of 5 states, clients who had continuity of care in any level of care were less

likely to have a readmission the is not followed by treatment. Oklahoma was the only state where continuity of care did not have a significant effect on readmissions, however, there are only a small number of detoxification providers in the state and readmission rates are low which may account for the lack of impact of continuity of care.

In Connecticut, Massachusetts, New York's MSW, and Washington, clients who received inpatient/residential treatment for substance use disorders within a short window of time after discharge from detoxification were less likely to have a readmission regardless of whether the readmission was followed by treatment. However, evidence was not as consistent when continuity of care was in outpatient treatment. Outpatient treatment may vary by state as to the specific interventions provided and treatment may vary due to state specific treatment policies which may account for the state variation in findings among clients with continuity of care in outpatient treatment.

In some states, such as Washington, continuity of care in residential treatment was beneficial in reducing the likelihood of both types of readmissions but the same effect was not found for outpatient treatment. This result is consistent with previous research focusing on relapse to substance use (McCusker et al., 1995) which found that detoxification clients who followed up with residential treatment had lower rates of relapse to drug use than those who followed up with outpatient treatment or who had no follow-up treatment at all. Clients with continuity of care in residential treatment compared to outpatient treatment may be less likely to have a readmission or relapse because residential treatment is a higher level of care and likely providing more intensive services over a longer period of time.

Furthermore, continuity of care in outpatient treatment was beneficial in reducing the likelihood of readmissions not followed by treatment in Connecticut, Massachusetts, and New York's MSW, but clients with outpatient continuity of care in Connecticut and Washington had more likelihood of any readmission. This relates to the discussion above regarding the potential need for more services or more intensive services in order to reduce the likelihood of any readmission for those with continuity of care in outpatient treatment.

New York's MMW tends to serve more homeless and alcohol clients, chronic clients who are more difficult to treat and least likely to seek treatment, and when they do enter treatment they may need more intense interventions or more treatment episodes to bring about positive outcomes. The characteristics of this population may explain why continuity of care did not reduce the likelihood of readmission for this group and why continuity of care in any level of care and residential treatment resulted in an increased likelihood of any readmission to detoxification. A study in Massachusetts, for example, found that post-detoxification stabilization programs were associated with improved outcomes for homeless clients (Kertesz et al., 2003). Specifically, the study found that homeless clients who entered post-detoxification stabilization programs, whereby receiving more extensive services, had lower rates of returning to substance use. A similar influence of stabilizing programs was not found for housed clients.

An overall continuity of care performance measure would be useful for monitoring performance across all levels of care, but it may also be useful for states and other entities to

monitor performance by level of care in which continuity of care occurs. This endeavor may signal that some levels of care are doing well in reducing future readmissions while other levels of care need improvement. In Connecticut, for example, an overall performance measure across all levels of care shows that continuity of care does not help in reducing any readmission, but examining performance by level of care shows that continuity of care in residential treatment helps to reduce the likelihood of any readmission while continuity of care in outpatient treatment increases the likelihood of any readmission. Using a measure across all levels of care would mask the effects of the continuity in different levels of care. Therefore, it may be beneficial to quality improvement efforts to use an overall measure and also to calculate performance rates by levels of care in which continuity occurred.

Since there is support for the benefits of continuity of care after detoxification, the policy implication is that in order to achieve better outcomes and avoid future readmissions to detoxification, all detoxifications should be followed with treatment. However, we acknowledge that all readmissions may not necessarily be negative events. At times, it is clinically appropriate for a client to be readmitted to another detoxification. It is better than not having any intervention at all and some detoxifications may have some positive aspects as the client is at least receiving some intervention including stabilization, and in some cases the client would also be provided with beneficial services that are usually associated with treatment such as counseling, medical and/or psychiatric services, or referral to treatment, which could eventually lead to a more positive status (Amodeo et al., 2008; Specka et al., 2011). Because substance use disorders are chronic illnesses during which clients may have multiple episodes, each one of these detoxifications has the potential of being the one that successfully connects the client to treatment. Therefore, a readmission to detoxification that is followed with treatment may not necessarily be a bad outcome compared to a readmission to detoxification that is not followed or associated with any other services. Our findings show that continuity of care is especially important in reducing readmissions that are not followed by treatment.

4.2 Consideration of client-level and facility-level continuity of care rates

Although the focus of this study is client-level continuity of care, continuity of care rates at both the client-level and facility-level may influence client outcomes and it is important to consider both when predicting client outcomes (Finney et al., 2011). Our findings show that client-level continuity of care after detoxification helped to reduce the likelihood of readmission for many clients while facility-level continuity of care had mixed results. These findings suggest that a client-level performance measure is useful to help providers identify clients who need intervention in order to continue on to treatment. In contrast, facility-level continuity of care rates may not always be informative for providers in terms of whether steps to improve service delivery are needed. Finney and colleagues argue that when clients-level analysis shows that meeting a performance measure is predictive of outcomes, that treatment process should be encouraged even when the facility continuity of care rate, is not related to outcomes. For those providers that find a relationship between continuity of care and readmissions, however, a low facility continuity of care rate can be useful in signaling to the facility that they need to review how they deliver services and make changes to improve continuity of care for their clients.

4.3 Importance of a performance measure for continuity of care

To serve as a useful performance measure, a process measure must be actionable (Horgan & Garnick, 2005). It must not only give providers information that improvement is needed, but also be associated with feasible actions that programs could take to bring about improvement. If feedback is made available to treatment agencies in a timely manner, the continuity of care measure could inform them about their continuity rates and make them aware of a need for improvement. Improving continuity of care may involve procedural changes, such as providing transportation to the next level of care; escorting the client to the treatment program if the agency has multiple levels of care on site; case management services that include aftercare planning and easing access to the next level of care; providing the client with treatment recommendations or intensive referrals to treatment; making a follow-up call to the client to see whether they were able to connect to treatment; or providing client incentives (Campbell et al., 2010; Carroll et al., 2009; Chutuape, Katz, & Stitzer, 2001; McKay, 2009; McKay & Hiller-Sturmhofel, 2011). Provision of service delivery methods that are alternatives to traditional clinic-based care in specialty settings is another way that facilities may increase continuity of care for its clients. For example, facilities can offer in-home services or delivery interventions, including counseling, over the phone (McKay, 2009; McKay et al., 2010; McKay et al., 2011). Training staff to practice active encouragement during the initial phase of treatment can be effective in keeping clients in continuing care (McKay & Hiller-Sturmhofel, 2011). In addition, detoxification facilities can develop relationships within a network of service delivery organizations in order to increase the number of places where they may refer clients to for further care and this may increase the number of clients who are provided continuity of care (Spear, 2014). When agencies are given information, in a timely fashion, regarding clients who may be at risk for failing to be provided with continuing treatment, they can make an effort to schedule treatment for those clients before the window of time has elapsed for meeting continuity.

One specific example of an intervention to reduce readmissions to detoxification is occurring in Massachusetts. The Massachusetts Behavioral Health Partnership (MBHP, a Value Options company) is collaborating with a university research group and providers throughout the state to implement and evaluate two innovative approaches for reducing detoxification readmissions among Medicaid clients who are repeat users. The program is supported by a Health Care Innovations award funded by the Centers for Medicare and Medicaid Services. First, MBHP has trained and deployed recovery support navigators, a specially trained cadre of personnel who offer flexible support to repeat detoxification clients in the community. Second, in addition to the recovery support services, members are offered contingency management-style incentives to encourage participation in recovery-oriented activities such as timely substance abuse treatment after discharge from detoxification.¹

Before broad adoption of a performance measure can be encouraged, there needs to be sensitivity testing of the measure specifications (Harris, Kivlahan, Bowe, Finney, &

¹This project is supported by Funding Opportunity Number CMS 1C1-12-0001 from Center for Medicare and Medicaid Services, CMS Center for Medicare and Medicaid Innovation. The contents are solely the responsibility of the authors and do not necessarily represent the official views of HHS or any of its agencies.

Humphreys, 2009). We tested the sensitivity of defining continuity of care as following up detoxification with treatment within 7, 14, and 30 days of detoxification discharge. The increases in continuity rates were small with changing definitions which allowed more time to receive continuity of care, indicating that most clients who are likely to meet the criteria for continuity do so in a shorter period of time. Furthermore, survival analysis results did not differ with changing continuity of care definitions. The Washington Circle had proposed a specification of within 14 days of discharge for the continuity of care after detoxification measure (Garnick et al., 2009; McCorry et al., 2000). Taking into account previous research together with results of this study, the 14-day window of time, the middle specification of the three tested, remains a reasonable choice. The 7-day time period may be considered too short by program directors subject to the measure, and there is some evidence that a 30-day time period may be too long to be effective in reducing readmissions (Carrier et al., 2011). Daley and colleagues evaluated provider profiling in Connecticut's Department of Mental Health and Addiction Services and found that meeting a 30-day continuity of care measure did not influence readmission outcomes (Daley et al., 2010).

4.4 Study limitations

Collaboration with multiple state agencies provided an extensive data set that included client demographic and treatment information. However, there were some limitations to our study which include generalizability, missing data, unobserved variables, limited information regarding facility continuity of care practices, and limited outcome variables.

Our study focuses on public sector treatment in five states and thus generalizability to private sector clients and to other states may not be appropriate. However, the majority of clients in substance abuse treatment are treated in the public sector (Mark, Levit, Vandivort-Warren, Buck, & Coffey, 2011). Another limitation is that by using administrative data, we may not have the client's complete treatment records for the two years that we study. If a client goes outside of the public sector treatment system for any services, our analyses would not capture those services and thus may underestimate readmission or continuity of care. Similarly, using administrative data from state agencies may not capture all methadone services. In some states, methadone encounter data may not be reported to the state treatment agency and thus not linked to the states' admission and discharge data. However, the type of care provided to the majority of clients is outpatient non-methadone or residential.

Although we had a rich data set using public sector treatment data from multiple states, we were limited to information available on state administrative data sets. There are variables that are not collected by states that might influence outcomes. For example, client proximity to treatment facilities and social support could influence continuity of care and readmission but our data sets did not include this information. Another unobserved variable is client motivation or readiness to change which impacts readmissions. Administrative data typically does not include clinician characteristics or facility characteristics such as protocols at the facility that focus on ensuring continuity of care for their clients or whether detoxification and rehabilitation programs are at the same location to ease the way to continuing care. In addition to unobserved variables that we would have liked to have controlled for in our

models, our outcomes were also limited to information collection and maintained by state agencies in their administrative data. Being able to test the measures with additional outcomes, other than readmission, would strengthen the case for the measures.

In spite of these limitations, the results of the study show relatively consistent findings across the states and affirm the merits of a performance measure for receiving continuity of care within a short time after discharge from detoxification.

4.5 Conclusions

Readmission to detoxification continues to be a problem. As one approach to addressing this problem, our study found that clients across multiple states who were provided continuity of care after detoxification in a timely manner were less likely to have a readmission to another detoxification, especially one that is not followed by treatment. Thus, specifying an overall performance measure across all levels of care that providers can use to monitor and improve the number of clients who meet continuity of care is important. In some states, continuity of care in residential treatment was found to be more likely to reduce readmissions compared to continuity of care in outpatient treatment. Therefore, in addition to an overall measure, calculating the measure by level of care in which continuity of care occurred may provide additional information for monitoring purposes since an overall measure may mask effects of different levels of care. Information about specific clients, who are at higher risk of not meeting performance criteria when monitoring is put in place, will allow programs to take steps to identify such clients, help them to continue on to treatment, and put them on the path to recovery. For providers where facility-level rates show an association with outcomes, giving them feedback in a timely manner about their continuity of care rate would allow them a chance to improve their performance. Our results add to the evidence of previous studies that connecting clients to treatment within a short time after discharge from detoxification is a beneficial practice which is associated with more positive outcomes for clients. Strengthening the evidence of the association of timely continuity of care with improved outcomes is an important step in establishing the usefulness of the performance measure prior to such a measure's endorsement and adoption.

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Figure 1.
Timeline illustration of continuity of care after detoxification and readmissions to detoxification.

Table 1

Client characteristics at beginning of index detoxification and facility continuity of care rates by state (%)^a

Characteristic	New York						
	Connecticut (N = 5,566)	Massachusetts (N = 18,329)	MMD ^b (N = 23,791)	MSW ^c (N = 10,149)	MMWD ^d (N = 7,040)	Oklahoma (N = 2,310)	Washington (N = 7,330)
Client demographics							
Female	27.9	28.9	25.5	27.1	19.1	37.4	33.6
Age							
18–20	5.2	5.2	2.4	3.0	5.0	7.5	5.0
21–25	13.8	16.9	7.6	7.4	9.9	19.8	12.2
26–30	12.3	15.9	9.7	8.8	11.1	16.4	12.2
31–44	39.9	39.3	39.0	40.3	42.8	34.0	36.9
45+	28.8	22.8	41.3	40.5	31.2	22.4	33.6
Race/ethnicity							
White	65.8	74.9	46.3	38.8	43.8	76.5	72.0
Black	13.6	9.0	28.8	33.1	40.0	11.8	9.1
Latino	18.9	12.3	21.3	25.9	13.9	2.3	4.3
American Indian	---	---	---	---	---	8.4	7.2
Other	1.7	3.9	3.6	2.2	2.6	1.0	7.4
Education							
No high school degree	27.4	25.0	34.1	34.5	34.4	26.5	70.8
High school degree	54.6	55.4	43.6	36.8	42.5	48.0	25.0
More than high school	18.0	19.6	22.4	28.7	22.1	25.5	4.2
Homeless	23.0	23.7	23.8	20.0	52.2	11.0	---
Married	---	13.0	---	---	---	18.5	---
Unemployed	---	82.3	84.2	80.9	89.1	78.5	---
Substance use and treatment referral source							
Reported alcohol and/or opiates as primary, secondary, tertiary drugs							
Alcohol ^f	42.8	38.2	52.0	53.5	67.3	49.4	57.6
Opiates ^f	42.7	44.0	28.0	23.6	9.8	25.6	22.5

Characteristic	New York					
	Connecticut (N = 5,566)	Massachusetts (N = 18,329)	MMD ^b (N = 23,791)	MSW ^c (N = 10,149)	MMW ^d (N = 7,040)	Oklahoma (N = 2,310)
Opiates and alcohol ^f	12.9	15.7	17.8	19.4	8.3	7.8
Neither opiates nor alcohol	1.6	2.2	2.3	3.5	14.6	17.2
Age of first use ^g						
10	5.9	6.8	5.7	7.6	8.6	7.5
11–14	30.0	31.2	24.0	30.0	32.6	25.0
15–17	28.3	27.3	31.6	30.9	30.1	26.8
18–20	15.7	15.2	19.3	15.3	16.8	17.2
21+	19.1	20.0	19.4	16.3	11.9	23.6
Treatment referral source						
Self/individual	---	86.3	81.1	59.3	50.9	86.2
Community	---	---	5.1	12.9	8.6	1.5
Criminal Justice	---	1.4	1.2	5.0	12.8	8.9
Addiction service	---	3.3	4.3	11.3	18.8	---
Health professional	---	6.7	6.1	7.1	5.2	---
Other	---	2.4	2.2	4.4	3.8	3.4
Detox admissions in Prior Year						
None	94.9	74.4	79.3	79.4	79.9	95.2
1	4.3	13.1	11.5	11.1	10.3	3.5
2 or more	0.8	12.5	9.3	9.5	9.9	1.3
Facility continuity rate						
Mean facility continuity rate (s.d.)	13.7 (5.5)	20.9 (6.5)	20.9 (8.6)	42.7 (22.0)	33.4 (13.3)	42.0 (28.7)
						26.9 (14.9)

^aThis table shows the sample of clients meeting continuity of care within 14 days of discharge from detoxification.

^bMMD: Medically Managed Detoxification

^cMSW: Medically Supervised Withdrawal

^dMMW: Medically Monitored Withdrawal

^eDashes indicate small number of clients for the category or high rates of missing data

^fSubstances other than alcohol or opiates could have been reported in combination with alcohol and/or opiates

^g Earliest age of first use of any of the substances reported as primary, secondary, or tertiary substance of abuse

Table 2

Percent of clients having continuity of care within 14 days of discharge from detoxification

Level of Care for Continuity	New York													
	Connecticut (N =5,566)		Massachusetts (N =18,329)		MMD ^a (N =23,791)		MSW ^b (N =10,149)		MMW ^c (N =7,040)		Oklahoma (N =2,310)		Washington (N =7,330)	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Any level of care	696	12.5	3,897	21.3	4,940	20.8	4,622	45.5	2,316	32.9	447	19.4	1,884	25.7
Outpatient	390	7.0	1,967	10.7	1,203	5.1	589	5.8	405	5.8	247	10.7	243	3.3
Inp/Residential	306	5.5	1,930	10.5	3,737	15.7	4,033	39.7	1,911	27.1	200	8.7	1,641	22.4

^aMMD: Medically Managed Detoxification^bMSW: Medically Supervised Withdrawal^cMMW: Medically Monitored Withdrawal

Table 3

Readmission to Detoxification by Type of Continuity of Care

	Connecticut	Massachusetts	New York						Oklahoma	Washington	
			MMD ^a	MSW ^b	MMW ^c	MMD ^a	MSW ^b	MMW ^c			
	%	%	%	%	%	%	%	%	%	%	
Continuity of Care in Any Level of Care											
Any Readmission	29.0	28.3	25.0	18.9	21.6	8.5	27.7				
Readmission Not Followed By Treatment	13.8	20.6	15.7	10.7	14.0	3.8	16.4				
Continuity of Care in Inpatient/Residential Tx											
Any Readmission	20.6	31.1	25.4	18.9	21.4	7.7	26.1				
Readmission Not Followed By Treatment	14.1	22.9	15.8	10.7	13.4	3.0	16.0				
Continuity of Care in Outpatient Tx											
Any Readmission	35.6	25.5	23.7	19.2	22.5	9.2	38.7				
Readmission Not Followed By Treatment	13.6	18.4	15.3	11.0	16.8	4.5	19.8				
No Continuity of Care											
Any Readmission	27.5	32.3	25.5	24.4	21.4	8.7	32.5				
Readmission Not Followed By Treatment	23.5	27.8	19.4	16.8	15.7	4.5	24.2				

^aMMD: Medically Managed Detox^bMSW: Medically Supervised Withdrawal^cMMW: Medically Monitored Withdrawal

Table 4

Client-level continuity of care within 14-days of discharge and hazard of detoxification readmissions ^a

	Connecticut			Massachusetts			New York		Oklahoma		Washington	
	Continuity			Continuity			Continuity		Continuity		Continuity	
	H.R.	(95 % CI)	H.R.	(95 % CI)	H.R.	(95 % CI)	H.R.	(95 % CI)	H.R.	(95 % CI)	H.R.	(95 % CI)
Any Level of Care												
Any Readmission ^b	1.00	(0.86, 1.16)	0.84**	(0.78, 0.90)	1.00	(0.89, 1.13)	0.86**	(0.79, 0.95)	1.17**	(1.04, 1.30)	1.01	(0.71, 1.45)
Readmission Not Followed By Treatment	0.57**	(0.46, 0.71)	0.73**	(0.67, 0.79)	0.87	(0.75, 1.01)	0.74**	(0.66, 0.83)	1.09	(0.95, 1.26)	0.91	(0.54, 1.57)
Inp/Resid Tx												
Any Readmission ^b	0.66**	(0.51, 0.85)	0.81**	(0.74, 0.88)	0.96	(0.89, 1.03)	0.86**	(0.78, 0.95)	1.17*	(1.04, 1.33)	0.90	(0.53, 1.55)
Readmission Not Followed By Treatment	0.54**	(0.40, 0.73)	0.69**	(0.63, 0.77)	0.81**	(0.74, 0.88)	0.74**	(0.65, 0.84)	1.07	(0.92, 1.24)	0.71	(0.31, 1.66)
Outpatient Tx												
Any Readmission ^b	1.32**	(1.10, 1.58)	0.88*	(0.80, 0.97)	1.00	(0.89, 1.13)	0.90	(0.74, 1.10)	1.12	(0.90, 1.39)	1.14	(0.73, 1.78)
Readmission Not Followed By Treatment	0.60**	(0.46, 0.80)	0.78**	(0.69, 0.87)	0.87	(0.75, 1.01)	0.77*	(0.60, 1.00)	1.19	(0.92, 1.53)	1.13	(0.59, 2.15)

^aControlling for facility-level continuity of care rates and other covariates in Table 1.

^bThe reference category for each variable is No Continuity.

^cMMMD: Medically Managed Detoxification

^dMSW: Medically Supervised Withdrawal

^eMMW: Medically Monitored Withdrawal.

* p < .05,

** p < .01